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Developing talent among low-income gifted learners: A review of recent research

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Developing Talent Among Low-Income Gifted Learners: A Review of Recent Research

Gallagher (2004) offered both a definition and a mandate: "there is no universal gifted child, only children who are more able than others in some areas of life. However, there are still clusters of these students waiting for someone to challenge their special talents" (p. xxiv).

Although there is much work yet to be done, research is increasingly available regarding the best ways to serve and further develop talent of high-achieving low-income students in grades K–12 and college. Gagné (2004) distinguished between gifts and talents with his Differentiated Model of Giftedness and Talent (DMGT), describing gifts as natural abilities that suggest potential and talents as the mastery or development of those abilities. He argued that development of those abilities is linked to environmental catalysts such as teachers and/or parents, or to intrapersonal catalysts such as intrinsic motivation for mastery (Gagné, 2004; Garrett & Moltzen, 2011).

Poverty is one environmental factor that can influence whether gifts are developed into talents. Understanding that poverty is not monolithic, however, is a vital consideration for those seeking to support talent development in students from poverty. There is variation not only between students of different demographic populations, but also within specific demographic groups (Gentry, Fugate, Wu, & Castellano, 2014; Stambaugh, 2009; Stambaugh & Chandler, 2012; Tomlinson & Jarvis, 2014). Gentry et al. (2014) described a powerful example of this variation. Because many of the assumptions in the literature about Native American students have been generalized across several different Native American tribes, 100 educators from three different Native American nations, the Diné, Lakota, and Ojibwe,

were divided into focus groups in order to examine the literature on talent development with Native American students. The educators represented sites with 95%–100% Native American student populations. The groups were asked to review themes in the extant literature regarding the Native American populations and talent development in order to identify what they deemed correct or incorrect. In addition, they were asked to add "new culturally specific understandings that were not included among the literature-based assumptions" (Gentry et al., 2014, p. 101).

Although there was some agreement among the focus groups with themes represented in the literature, the results of the analyses challenged assumptions in the literature on gifted Native Americans. These "frequently generic" (Gentry et al., 2014, p. 99) generalizations across tribes included the assumption that all Native Americans found the recognition of giftedness and talent development culturally incongruent. One example from Gentry et al.'s (2014) study was this commonly held assumption: "Hartley (1991) and Robbins (1991) stressed that feelings and display of knowledge were neither openly expressed nor encouraged by teachers and parents or within tribal traditions" (p. 100). Although the Lakota educators agreed this was the case, it was not considered accurate among the Diné.

The focus groups' analyses also provided new understandings. The Diné focus group, for example, stated that, in addition to recognition of naturalist, spiritual, artistic, musical, and other strengths associated with creativity and often attributed to Native American students, a focus on mathematics and verbal skill strengths was also necessary. The Lakota Nation educators thought it important to bridge both the information gap for students regarding postsecondary education and career options as well as the cultural gap between non-Native educators and Native students. The Ojibwe Nation educators rejected the idea of the school's role in cultural teaching, stating that cultural teaching should begin at home

with the elders (Gentry et al., 2014). From this study's findings, it is evident that beliefs about the appropriate path of talent development among diverse members of the same demographic group (e.g., Native Americans) can vary widely.

In a study of 31 Native Canadian students taught by Anglo-Canadian teachers, Kanu (2006) sought to determine the most effective ways to integrate Native cultural knowledge into curriculum and instruction and to determine if such integration affected academic outcomes. Students were divided into two social studies classes. Half of the students received the integrated curriculum, and half did not. Students in the class receiving the integrated curriculum and instruction pedagogy performed significantly better on exams and assignments. Their overall scores averaged 72% versus 48% for the students who did not receive the integrated curriculum (Kanu, 2006).

The importance of making cultural connections for students underrepresented in gifted education is suggested for other demographic groups as well. Davis, Rimm, and Siegle (2011) summarized the following factors related to achievement for low-income and minority students: resilience, family support, racial identities and grit, investment of time, and opportunity. These factors were evident in program models described by Olszewski-Kubilius and Clarenbach (2012, 2014). For example, the Fairfax County Public Schools' Young Scholars model and the Northwestern University Center for Talent Development's Project EXCITE both target elementary school students, but one is an in-school program and the other is an out-of-school program. Participants in each program increased in achievement as demonstrated by performance on standardized tests and eligibility for participation in honors and Advanced Placement (AP) classes (Horn & Fisher, 2006; Olszewski-Kubilius, Lee, Ngoi, & Ngoi, 2004). Each program has a strong parental involvement/support component. Flint (2010) pointed out "A family's communication style,

education level, parenting style, consistency of expectations and discipline, and organization within the home are just a few of the many factors that affect the success or failure of gifted children" (p. 5).

Talent Development and Response to Intervention (RtI)

Another model used in talent development that has a strong parental involvement component is Response to Intervention (RtI). Developed as a strategy for effectively scaffolding the learning of students with disabilities, RtI involves frequent assessment of a student's weaknesses (in the case of students with disabilities) and strengths (in the case of students with gifts and talents), with carefully planned instruction to address the identified need (The Association for the Gifted, 2007). Advocates for gifted children view RtI as a potential tool for supporting the education of students with high ability, especially those who are typically underrepresented in gifted education programs. The standard protocol model and the problem-solving model are the two primary approaches used to design the RtI process in schools. Whereas the standard protocol model is structured to provide uniform instructional methods, including scripts to ensure the fidelity of instruction for the largest amount of students without relying on "uneven training and backgrounds" (p. 21) of the instructors, the problem-solving model, most often used in gifted education, depends on the expertise of school personnel to provide the most effective services to the individual student (Rollins, Mursky, Shah-Coltrane, & Johnsen, 2009).

The key components of RtI are consistent with recommendations for identification and talent development of low-income gifted students. Coleman and Hughes (2009) explored the possibilities for gifted education with an RtI framework and described it as "a good fit" due to its emphasis on collaborative planning, early intervention, provision of services prior to formal identification, scaffolding of support and instruction, and parental

involvement (p. 17). Certain states such as Wisconsin, Colorado, Ohio, Utah, and Hawaii already have articulated policies regarding the inclusion of gifted students in their RtI model (Brown & Abernethy, 2009; Klotz & Canter, n.d.).

Hughes and Rollins (2009) pointed out, however, that the goals of using RtI in special education and gifted education are different. In special education, the goal is remediation to make children in special education more similar to their general education peers, and in gifted education, the goal is to nurture students' strengths, which would invariably increase the differences between students in gifted education and their peers.

> There will be "closing of the gap" in a remedial-based RtI Model if student strengths are ignored and the top is left to remain static while the lower achieving students grow and develop. However, in an RtI model, where there also is a strength-based emphasis, the gap between the lowest students and the highest students should expand if no cap is placed on student achievement. All students should have opportunities to make continual growth. (Hughes & Rollins, p. 39)

Although there has been much discussion in the literature about the use of RtI with gifted students, particularly with twice-exceptional students (Yssel, Adams, Clarke, & Jones, 2014), no empirical research at this time supports its use as a means for developing talent.

The Role of Counseling in Talent Development

The affective environment in a school is critical to talent development, and school counselors play a very important role in supporting underrepresented gifted students by seeking to understand their experiences and support their academic aspirations (Cross & Burney, 2005; Henfield, Washington, & Byrd, 2014). Project ASPIRE (Cross & Burney, 2005) was one such program with the goal of integrating counselors in the talent development conversation. Over a 3-year period, in a series of meetings, 21 counselors from

small rural schools were exposed to expert presentations, research, and literature on students of poverty, and had the opportunity to share successful practices. They were also able to reflect on the experience of working with gifted students from rural, high-poverty communities. Emerging from their feedback were three themes. First, counselors perceived that students found rigorous coursework to take too much of their free time, which made it difficult for teachers to convince students to enroll. Second, school climate could be discouraging for some students to participate in advanced classes. In particular, there often seemed to be a bias against girls. Third, generational poverty often created social barriers, such as social mores that did not transfer well to the school setting. Many families, for example, did not encourage students to consider moving away after high school graduation in order to pursue higher education, which made it difficult for students with academic aspirations. Distrust of the government caused some parents to be unwilling to provide information on federal forms such as the Free Application for Federal Student Aid (FAFSA) that would allow students to document eligibility for financial aid. This information can aid counselors who work with low-income students.

Henfield et al. (2014) also explored ways that school counselors can impact talent development in an examination of the opportunity gaps for gifted African American boys. They stressed the importance of the counselors' role in creating an environment in schools that is more "inviting and hospitable to Black males" (Henfield et al., 2014, p. 149). Among the suggestions for creating an affective environment conducive to talent development were multicultural counseling with culturally competent counselors. D. W. Sue and Torino (2005) defined multicultural counseling and therapy as:

> both a helping role and a process that uses modalities and defines goals consistent with the life experiences and cultural values of clients; recognizes client identities to

> include individual, group, and universal dimensions; advocates the use of universal and culture-specific strategies and roles in the healing process; and balances the importance of individualism and collectivism in the assessment, diagnosis, and treatment of client and client systems. (as cited in Sue & Sue, 2013, p. 46)

School counselors who engage in strategies to build a sense of community by creating safe spaces for Black males to discuss their school experiences, including their experiences in gifted programs, may play a critical role in their talent development. In addition, Henfield and colleagues (2014) stressed the importance of encouraging Black males to participate in activities that challenge the anti-intellectual stereotype, such as chess or debate. They also pointed out the importance of data collection on the experiences of gifted Black males within a school to inform that school's practice. Finally, they suggested that counselors should facilitate multicultural competency professional development for their colleagues as well as for themselves to promote talent development of Black males. The authors hoped to call attention to what they described as "opportunity gaps," in order to assist counselors in helping Black males in and out of school (Henfield et al., 2014).

School-Level Leadership

Even as the counselors can have a potential impact on the affective environment in the school, principal leadership is also important to the school's climate. Principals make decisions on a daily basis that impact gifted students' access to an education commensurate to their abilities, and are essential to school effectiveness because of the important, though indirect, effect they have on student achievement (Louis, Dretzke, & Wahlstrom, 2010). Principals affect student learning through the improvement of teacher practice. Quality staff development focused on student learning strengthens teachers' instructional skills, and

affects how teachers work with each other and with individual students (Lewis, Cruzeiro, & Hall, 2007).

Using purposive sampling and a multiple case study design, Tomlinson and Jarvis (2014) investigated three school sites that were reputed to have effective practices supporting the academic success of low-income minority students. Over a 4-year period, they collected data by interviewing teachers and administrators, interviewing students in focus groups, and reviewing documents including school publications, student achievement data, lesson plans, and work samples. Several themes emerged, including:

- The importance of a coherent and articulated, shared vision for student success that is implemented in teaching and programming schoolwide.
- Genuine efforts on the part of school personnel to understand the students' background and experiences. This included efforts to get to know the students' families, attend their extracurricular activities, and monitor their progress outside of class in very specific ways.
- The importance of curriculum, instruction, and assessment.

Although described as representing varying degrees of effectiveness and approached differently at each of the sites, aspects of practice at each site supported high-level achievement. The results indicated that only two of the sites reputed to be effective actually were effective in supporting the academic development of low-income minority gifted students through the study's end. The researchers suggested that outcomes were impacted by a change in principal leadership during the course of the study, from a strong principal whose vision was not sustained after the transition.

Access to the site became increasingly difficult as the study progressed and a new principal assumed leadership of the school. As data collection continued, a lack of

> common philosophy and set of practices among its mostly veteran teaching staff became evident and early promising efforts diminished. It became increasingly difficult to find clear examples of the school's success with the target population. (Tomlinson & Jarvis, 2014, p. 200)

Tomlinson and Jarvis's (2014) study evidenced both the upside and downside of the impact of the principal on gifted education.

Impact of Curriculum on Talent Development

The federal No Child Left Behind Act (NCLB) had the effect of limiting curriculum in many school districts (Reis & Renzulli, 2010; Wyner, Bridgeland, & DiIulio, 2007). Consideration of talent development must be linked to research-based curriculum models. Brighton (2001) pointed out that many thinkers in the field of gifted education have recommended several different approaches to development of curriculum for high-ability students, including acceleration, enrichment, problem-based learning, and creativity-focused models. Brighton suggested that instead of approaching differentiation with yet another new model, integrating complementary practices may be more useful to practitioners.

In a study of the efficacy of program and curriculum models used in the field of gifted education, VanTassel-Baska and Brown (2007) examined nine models that are currently in use, six of which have research regarding their effectiveness, including the two most widely used: Stanley's talent search model and Renzulli's Schoolwide Enrichment Model (SEM). From these studies, several best practices were identified. These included allowing flexible grouping of students for work in advanced curriculum at an accelerated rate based on their level of learning within a subject area, providing professional development to ensure appropriate training of teachers to implement core subject-area curriculum with higher level thinking models and skills embedded within, using inquiry as a strategy to

promote learning through creative problem solving and decision making, and addressing affective needs of the learner by using problem-based learning that the student finds relevant.

Model Programs

Researchers continue to recommend out-of-school enrichment programs for low-income, high-ability students (Miller & Gentry, 2010; Sosniak, 2005). One demonstrably effective example was Project LIVE (Lee, Olszewski-Kubilius, & Peternel, 2010), a program of enrichment and acceleration focusing on the development of verbal talent for students in grades 6–8. The goal of Project LIVE was to increase the number of low-income students who qualified for placement in honors English in high school. Students from families with incomes below the median for the city of Evanston, IL, were eligible to participate. The program provided a weekly afterschool reading and discussion club featuring high-interest fiction and nonfiction, writing activities, and short courses on etymology, grammar, and usage. It also included intensive 3-week writing workshops and Saturday cultural activities such as field trips to museums, libraries, and theaters.

Participating students experienced significant gains in performance in verbal areas on the Illinois Standards Achievement Test (ISAT) and EXPLORE, a pre-ACT test designed by ACT for eighth and ninth graders. Lee et al. (2010) found that, between eighth and ninth grade, Project LIVE participants gained close to 3 points on the reading and English portions on the EXPLORE subtests, compared to the typical rate of growth of less than 2 points for students nationally. This resulted in placement in honors English in high school for 2/3 of the program's participants, representing a significantly higher rate of placement than the percentage of high school freshmen in honors English for the district.

Worrell, Szarko, and Gabelko (2001) also studied out-of-school program participation, specifically focusing on the importance of ongoing participation in gifted education programs to talent development. In a 9-year database study, they examined the return rate of traditionally underrepresented students to a 6-week summer program for academically talented youth offered at a San Francisco Bay area university. A total of 316 of the potential participant pool of 492 African American, Latino, Asian American, and/or low-income students from an urban school district in the San Francisco Bay area attended the program. Students ranged in age from 11 to 17 years of age, representing rising 7th- through 11th-grade students. All were invited to return after the first year. Despite a research-supported program design that intentionally included academic and social-emotional supports such as tuition, books, incidentals, transportation, mentor/tutors, and counselors, only 44% returned the second year. Worrell and colleagues suggested the need for future research to examine those psychosocial variables related to a student's choice to return, and find ways of modifying those.

Although there are many out-of-school enrichment programs that provide challenge and academic rigor for high-ability students, for many underrepresented students, the price is prohibitive when scholarships are not available (DeLong, 1994). For most students, effective public school programs that offer opportunities for academic rigor are imperative (Reis & Renzulli, 2010). Coleman (2006) described three educational models found in schools: the whole child educational model (WCM), talent/multiple abilities model (TMM), and the basic skill educational model (BSM). He argued that, because the structure of the TMM model is oriented toward talent development, it encourages discovery of talents as early as possible, which the literature regarding talent development in economically disadvantaged populations

indicates is critical. As the child develops mastery, creativity will emerge and the child will be more likely to maximize his or her potential in the talent domain (Coleman, 2006).

Practical support for parents to be able to access and take advantage of resources and opportunities that may be available for their children is also important. For example, with Project EXCITE (Olszewski-Kubilius et al., 2004), students were given computers as part of the program and Internet service was paid for. Initially, families were not accessing information on the program's website because the computers were not being used. However, the Center for Talent Development at Northwestern University responded by providing word processing classes to the parents and showing them how to access the Internet. Because the program administrators did not approach this challenge with a deficit mindset, both the participating students and their families received an enriched experience (Olszewski-Kubilius et al., 2004).

Domain-Specific Talent Development

Timing is very important when considering talent development in that developmental trajectories are domain-specific (Subotnik, Olszewski-Kubilius, & Worrell, 2011). Thus, the appropriateness of tests to assess talent potential in specific domains is also important to consider (Andersen, 2014; Mann, 2014). Andersen (2014), for example, argued for the importance of considering visual-spatial ability in science, technology, engineering, and math (STEM) talent identification and development and the limitation of the IQ measures commonly used to provide information about students' visual-spatial abilities.

In a meta-analysis, Macnamara, Hambrick, and Oswald (2014) investigated studies of the relationship between deliberate practice and expert performance in various domains including music, sports, and education, among others. The results indicated a positive correlation in each of the domains between deliberate practice and expert performance, but

not to the degree that the researchers had expected. Although opportunities for deliberate practice are important, other factors that the researchers suggested may be genetic, such as working memory, impact talent development of students with high academic ability as well (Macnamara et al., 2014).

Robinson (2012) pointed out that the theoretical construct of domain-specific talent development may be an attractive tool for gifted education advocacy because it presents an opportunity for building connections between gifted education and fields where leaders are "moved by data, rationality, and the bottom line" (p. 203). However, it may also present unintended consequences at the local level where state and local policy makers must often be pragmatic in their decision-making. She cautioned that if the statutory language is changed to reflect the construct of talent development in states that require programs to serve gifted students, it could lead to weakening of protections that are in place that mandate funding for services targeting gifted children (Robinson, 2012).

Off-Level/Above-Level Testing

Beyond being used for identification for participation in gifted education programs, testing is also discussed in the literature as important to talent development. Thomson and Olszewski-Kubilius (2014) stressed the importance of off-level testing, the process of giving students tests above their grade level in an attempt to remove the ceiling effect of grade-level tests in order to get a truer picture of students' abilities. Thomson and Olszewski-Kubilius described it as a more "accurate and meaningful assessment" tool for talent development in order to help identify a student's particular strengths (p. 39). In a case study of the off-level testing by the Center for Talent Development at Northwestern University, Thomson and Olszewski-Kubilius described the use of the specific score levels in helping to determine the types of programming and range of services needed by each student at a given time (p. 39).

Warne (2014) argued, however, that although the value of above-level testing to determine readiness for participation in talent search programs undoubtedly has value, studies that examine whether above-level testing measures academic preparedness for acceleration are not available in a peer-reviewed journal, thus, limiting claims.

Important Ways to Serve and Further Develop Talent

VanTassel-Baska (2005) described "nonnegotiables" that must be in place for a school to meaningfully focus on talent development. These include policies regarding acceleration, differentiated curriculum, differentiated instruction, and appropriate assessment that are enacted with the understanding that all children do not learn in the same way and at the same pace. When children who are ready to move on academically are forced to meet minimal standards, valuable windows of opportunity shut for development of talent in certain domains.

Support for talent development, however, cannot be limited to in-school time. Talent development includes provision of meaningful out-of-school activities such as summer and Saturday enrichment programs. These programs often have enriched curriculum and higher level opportunities than students may be receiving in their schools. Partnering with parents is critical for both in-school and out-of-school programs (VanTassel-Baska, 2005).

From this review, we can add the importance of integrating cultural knowledge into curriculum and effective professional development for counselors. Avoiding a deficit mindset is critical. Principals who support appropriate professional development for their faculty and staff are integral to the successful development of talent among low-income and culturally diverse students. The lesson learned from out-of-school enrichment programs is the importance of early access for domain-specific talent development. Successful programs

were funded, although Worrell et al. (2001) were unable to sustain participation, even when costs were covered. Individualized support of the family's technology skills was key to success in Project EXCITE (Olszewski-Kubilius et al., 2004). More research is needed to identify the individual and contextual factors that are necessary for successful talent development among low-income, high-ability students.

Distance Education and Advising

Among VanTassel-Baska's (2005) "nonnegotiables" was telecommunications as a tool for differentiation, including acceleration. Although little research on this topic has been conducted specifically with low-income, high-ability students, this review includes many themes that are transferable. Much can be learned from the literature regarding the challenges and benefits of using technology for advising and instruction. In a search for information about technology and distance education and advising, one can find attempts to answer questions about persistence, the academic impact of students' relationships with their advisors, trends in online advising, the impact of the digital divide, and advocacy for low-income families, among other related topics (Dahl, 2004; Gravel, 2012; Norris & Conceição, 2004; Stevenson, 2013). In some of the literature, researchers note the benefit of online advising and distance education for first-generation, low-income college students (Brunner, 2013; Norris & Conceição, 2004; Pontes & Pontes, 2012; Seay, 2006). In other studies, the detriment of distance education to this same population is stressed (Bidwell, 2013). What each of the aforementioned studies has in common is that they focused on adult learners.

Rice (2006) examined the extant literature on K–12 distance education and found that there is limited research on which program development is based. Pointing out that distance education ranges from traditional home study correspondence courses to the most advanced technology, Rice blamed the research community for the lack of a theoretical

framework for much of the limited research actually conducted on K–12 students. Because K–12 has based their instructional program development on adult education models of technology-based learning found in public education settings and the corporate world, Rice proposed that this leaves research at the K–12 level limited as well. Rice stated, "One thing we do know is that the effectiveness of distance education appears to have more to do with who is teaching, who is learning and how that learning is accomplished, and less to do with the medium" (p. 440).

The Role of Teachers

Whether in person or online, effective instructional pedagogy is critical to student success. In a study of nine teachers who had taught at least one online course, Thomson (2010) found certain themes emerged regarding what makes for effective online instructional strategies. These were strategies to facilitate student-teacher interactions, student-content interactions, and student-student interactions. Teachers also shared ideas as to how each was best accomplished. Most agreed that student-teacher communication was best facilitated by "frequent, prompt, positive/encouraging, and individualized and whole-group communications" (Thomson, 2010, p. 34).

To facilitate student-content communication, teachers stressed setting up the course site so that it is easy to follow and expectations are clearly outlined. Noting that the results were inconclusive as to the degree by which instructors teaching distance education courses should attempt to facilitate effective student-student interactions, some teachers stated that student-student communication was intentionally facilitated to a much more limited degree. This was due to teachers' perceptions of the reasons students who choose to take the online courses do so. One main reason given for taking online distance education courses by several students, for example, was the desire to work at their own pace. Teachers felt an

emphasis on student-student interactions may not be consistent with this goal for many students (Thomson, 2010).

On the other hand, distance education as a means to build a community with intellectual peers was an important outcome of participation for some students. Blair (2010) sought the perspective of parents whose children were enrolled in online gifted education courses through the Center for Talent Development at Northwestern University. Of those identified, five of the parents were White/Non-Hispanic, one was Asian/Pacific Islander, and one was Latina. The parents interviewed had children between the ages of 11 and 17 years of age. Using open-ended questions, Blair gathered their feedback. Flexibility and the quality of the instruction were reasons parents gave for enrolling their children in the Center's distance education program. Another theme was based on the social aspects of program participation. Parents believed the opportunity for their children to interact with intellectual peers was another beneficial aspect of the online program (Blair, 2010).

Rural Community Challenges

Rural gifted students face particular challenges in gaining access to academically rigorous opportunities (Howley, Rhodes, & Beall, 2009; Nielson, 1993). Howley et al. (2009) explored literature on rural schools and identified four challenges rural schools face. They described them as "declining populations, persistent poverty, changing demographics, and ongoing accountability requirements" (Howley et al., 2009, p. 516). These issues negatively impact the education of gifted students and are among the reasons access to distance education holds promise for rural gifted students. Rural districts, however, have unique challenges in providing access to technology for their students (Irvin, Hannum, de la Varre, & Farmer, 2010).

By randomly selecting 417 districts from those qualifying for the 2004–2005 Rural Education Achievement Program (REAP), Irvin et al. (2010) examined challenges to distance education in rural districts. To qualify for REAP, districts had to have fewer than 600 students in counties with fewer than 10 people per square mile. These districts were identified due to the likelihood that they would need distance education to overcome challenges to providing a comprehensive curriculum, including staffing shortages. Using a survey consisting of both open- and closed-ended items, they sought general information about the district, including barriers to distance education. Barriers were grouped as they related to district, logistical, personnel, and technology. The results indicated that barriers to distance education that were identified included perceptions that there was not a need for distance education based on curriculum requirements, funding, scheduling, not being a district priority, and untrained personnel. Connectivity and maintenance were mentioned least (Irvin et al., 2010).

Distance Education and Gifted Students

McKinnon and Nolan (1999) described the implementation of three distance education courses designed specifically for gifted students in New South Wales, Australia in the late1990s. One of the courses had an interactive component that allowed students, many of whom lived in very remote areas, to facilitate communication via mail, fax, email, listservs, and the Internet. The students reported that the capacity to communicate made the Cosmology Distinction Course a higher quality learning experience. McKinnon and Nolan (1999) suggested that the communication system was the aspect that sustained the inquiry at a high enough level to continue to appeal to gifted students.

Three studies examined the effectiveness of distance education as a tool for mathematics acceleration on both the elementary level and secondary level. In a case study

that borrowed autoethnographic strategies, St. Cyr (2004) explored the efficacy of distance education, using technology for acceleration of elementary mathematics students. She described the challenges that led to her pursuit of this strategy with one student. Although the student benefited from the content, the process of taking tests online and consistently accessing the tutorial emails had to be overcome before he could get the most benefit from the technology and the course. St. Cyr suggested that teachers participate in professional development to become proficient users of technology in order to more effectively guide their students not just in academic content, but also in the actual use of the technology.

Wallace (2005) proposed that technology provides the opportunity to expand academic offerings for students such as gifted learners, whose needs are harder to meet in the regular classroom. She conceded, however, that findings and trends in the extant literature are varied when comparisons are made between the effectiveness of in-person instruction versus distance learning and advising. In a case study of the Johns Hopkins University's Center for Talented Youth (CTY) distance education program, Wallace pointed (2005) out that, since 1984, more than 6,000 students per year from more than 50 countries have been able to take courses from home, with many options of advanced courses. Eligibility is based on the student's performance on above-level tests. These courses provide opportunities for acceleration, advancement, and enrichment in their strongest subjects (Wallace, 2005).

Wallace (2009) later explored the effectiveness of distance learning for gifted students based on their age groups. The dearth of research on younger students and distance education make the outcomes of the study worth noting. A total of 690 school-aged participants enrolled in CTY completed an online survey. Results varied between younger and older students in two categories in particular, the reason for taking the course and

perception of intellectual demand of the course. For students under 12 years of age, interest in the subject matter was the primary reason for enrolling in courses. In contrast, older students were more likely to take the courses for credit and rate the courses as more intellectually demanding. Parents' survey responses were also evaluated, with parents of students in different age groups showing no significant difference in their levels of satisfaction with the courses (Wallace, 2009).

Adams and Cross (2000) examined the benefits and challenges of using distance education in gifted education. The study was inclusive of programs that varied in delivery models. The A. Linwood Holton Governor's School, for example, created in response to the harsh geography and winters in Southwest Virginia, was designed to take advantage of school-based technology centers with all instruction Internet-based. There is no Governor's School "site" per se, but via the Internet, students take advanced courses that combine technology with interdisciplinary curriculum while remaining in their home schools.

The Massachusetts-based Regional Electronic Magnet School Re: Math and Science ($REMS^2$) also sought to address geographic concerns in the design of its program. This STEM-based program was a collaborative effort between 15 high schools. Two students from each school and their math and science teachers engaged in authentic research with corporate and university scientists and mathematicians. All participants were linked via access to their state's electronic database. These efforts culminated at the University of Massachusetts in a summer institute for 2 weeks where students chose scientific and mathematical topics that were of interest to them. In addition, they were able to connect these studies to real-life skills used in the career fields. Adams and Cross (2000) pointed out:

> Students learned experimental design, laboratory skills, instrumentation, mathematical modeling, and data analysis, while engaged in specific scientific and

> mathematical topics of interest to them. Computer applications, careers in mathematics and science, communication skills, and ethics in scientific study and implementation were addressed. ("Regional Electronic Magnet," para. 3)

Whereas the A. Linwood Holton Governor's School and the REMS^2 program expanded their reach through technology-based models, the Indiana Academy for Science, Mathematics, and Humanities is a residential facility that brings gifted students from throughout the state together in one place. Some distance education opportunities are available through the Indiana Academy, however, that provide opportunities for exposure to advanced curriculum and electronic field trips for students and professional development for teachers from across the state, and in some cases, beyond state boundaries (Adams & Cross, 2000).

Distance Education and Low-Income Students

Olszewski-Kubilius and Corwith (2010) pointed out that although distance education as a phenomenon is not new in the United States, much research is needed on the current proliferation of new technology-based distance education programs. As of 2010, through just four talent search centers, the authors noted that more than 34,644 gifted students in grades 3–12 took courses via distance education. Centers that offer precollege distance education programs specifically for gifted students include CTY at Johns Hopkins University, Talent Identification Program at Duke University (Duke TIP), the Center for Talent Development (CTD) at Northwestern University, the Wisconsin Center for Academically Talented Youth (WCATY), and the Education Program for Gifted Youth (EPGY) at Stanford University. That number may not include students who used technology to take courses through their schools or some other community-based organization. Addressing issues of access for low-income students due to barriers such as inability to

purchase a computer and access the Internet is foundational to any program designed to incorporate technology into distance education for low-income students (Olszewski-Kubilius & Corwith, 2010).

How to help low-income, high-ability students benefit most from the integration of computers may be suggested by the outcomes of a study of 37 low-income, culturally diverse youth between 13 and 17 years of age who participated in a yearlong intensive technology-based program. O'Donnell and Coe-Regan (2006) sought to determine if technology combined with youth development efforts could enhance students' skills in areas beyond stated technology goals. These goals included web design, digital story telling/movie making, animation 2D & 3D, digital graphics, and other skills. In addition, they hoped to use technology to monitor student achievement and provide homework assistance to provide college readiness and preparedness classes and other school-related support as well as job readiness and technology peer mentoring opportunities. Using quantitative and qualitative data, including surveys and focus groups, participants self-reported improvement in leadership skills, improvement in technology skills, and improvement in how often they used technology. Results indicated that technology-based programs improve technology skills and other skills as well (O'Donnell & Coe-Regan, 2006).

Advances in technology have expanded the possibilities of distance education. Although little research has been conducted on the specific use of distance education with low-income, high-ability students, transferable themes in the literature indicate the use of distance education for advising and instruction presents both challenges and benefits. Challenges include those that are related to the learner population, the curriculum content and instruction, as well as those relating to the use of the technology itself. Students who are gifted, low-income, rural, culturally and linguistically different, or any combination of these,

will each have challenges. Like a Venn diagram, some challenges can be seen as specific to that particular group, while others are universal to all students seeking to take advantage of distance education and advising via technology.

Gifted students need flexibility with student-centered curriculum, enrichment activities, and opportunities for independence. In addition, low-income gifted students need access to enriched curriculum and technological equipment, as well as appropriate training on its use, and they need to have cultural differences bridged and affective issues addressed so that they can make the most of opportunities presented. For rural students, technology expands the reach of distance education, making differentiated and interactive curriculum accessible to students despite sparse populations and resources.

Whether the curriculum is appropriate for serving gifted students must be established as a separate, yet complementary issue to those relating to facilitating the curriculum through the medium of telecommunications. What works in gifted education curricula is still dependent upon having teachers who are effective instructors, whether in person or through distance learning. This will ensure that lessons are not only set up in a way that is easy to follow online and are interactive, but also have appropriate rigor and opportunities for differentiation. It is critical that the equipment itself does not hinder students participating in programs that deliver instruction via telecommunications. Having telecommunications facilitators when there is no onsite teacher or providing adequate training before giving student computer equipment to use at home also lends itself to students getting the most from their distance education and advising experiences.

There are many potential benefits as well. Distance education provides a means by which instruction can be differentiated and accelerated to accommodate those learners who require more rigor than their school or district may be able to provide. For students who

miss opportunities and are not meaningfully stretched to grow academically due to the limitations of the traditional educational system or their specific locale, distance education and advising holds great potential. Factors that facilitate the effectiveness of distance education and advising, especially with high-achieving low-income students, begin with ensuring that students have meaningful access to the technology. For many students from poverty, facilitated school or community-based technology centers may be necessary. If this strategy is implemented for talent development, not only will the students benefit, but when all students, no matter their geographic or economic limitations, can have access to an education commensurate with their abilities, our nation will benefit as well.

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